A6755-2U 11/83

NAFA'S ANNUAL REFERENCE BOOK 1984

NAFA

Sales and Service Representatives **Service Recommendations**

EPA Gas Mileage Figures

Table of Contents

Estimated Gas Mileage Figures 6
EPA's gasoline mileage figures for all 1984 models.

Computer Software for Fleet Management 14
A thorough background on the various types of vehicle management software packages available.

Pribish on Computer Technology 24
In his presentation "Fog, Spit and Spray," Al Pribish of the Michigan Career Institute discusses the technology that has defied the fleet administrator to 'catch up.'

CANADIAN SECTION

Taxable Benefits: 1982 and Beyond 30

Canadian Operating Costs in ¢/Mile 32

Licensing Procedures for the Canadian Provinces 36

U.S. State Automobile Insurance, Registration and Tax Facts 38

Manufacturer's Sales and Service Representatives
American Motors Sales Corporation 40
American Motors (Canada) Inc. 40
Chrysler Corporation 42
Ford Motor Division 44
Ford of Canada 46
Lincoln-Mercury Division 48
General Motors Corporation 50
General Motors of Canada 50
Buick Motor Division 52
Cadillac Motor Car Division 54
Chevrolet Division 56
Oldsmobile Division 58
Pontiac Motor Division 60
Nissan Motor Corporation in U.S.A. 62
Nissan Automobile Co. (Canada) Ltd. 63
Toyota Motor Sales 64
Toyota of Canada 64
Volkswagen of America, Inc. 66

NAFA's Operating Expense Reports 68
Operating expenses for the composite fleet for the years 1980, 1981 and 1982.

20 Year History of Fleet Expenses 69

NAFA Safety Survey Summary 70
Reveals highway accident statistics for 1983.

Sources of Automotive Information 72
Listing of associations and government agencies active in the automobile industry.

Automotive Publications 78

NAFA Bulletin Editorial Index 80
Your guide to feature articles appearing in 1981, 1982 and 1983 issues of NAFA Bulletin.

MAINTENANCE SECTION

Car Sounds: What They Mean 88
A service signals checklist for the car owner.

Car Service Recommendations
Domestic Service Recommendations for 1981 92
Domestic Service Recommendations for 1982 94
Domestic Service Recommendations for 1983 96
Domestic Service Recommendations for 1984 97
Imported Car Service Recommendations for 1981/82 98
Imported Car Service Recommendations for 1983/84 100

Walk-Around Inspection Form 102

Warranty Coverage for 1983 Vehicles 104
NAFA's Technical Service Consultant Joe Alacchi provides you with the warranty coverage for all the major automobile manufacturers.

Tires 112
Information on tires including type, construction, wheel balance and alignment, warranties, grading, sizing and wear problems.

Index to Advertisers 116

EPA's 1984 Estimated Gas Mileage Figures

U.S. automobile manufacturers have achieved nearly 100 percent improvement in fuel economy over the last decade, according to the Environmental Protection Agency's 1984 model year mileage figures.

EPA noted that when the mileage estimates were first published in 1974, domestic cars averaged 13.2 miles per gallon. The projected fleet average for the 1984 domestic models is 25.6 mpg, up 94 percent from 10 years ago. The projected fleet average for all 1984 foreign and domestic cars is 26.9 mpg, an improvement of 89 percent from the 1974 level of 14.2 mpg.

The following mileage ratings, provided by EPA, include all vehicles sold in the United States except California. These mileage ratings represent city driving figures.

The EPA estimates do not predict the actual mileage that will be obtained. Instead, the Agency's Fuel Economy Guide provides a way to compare the relative fuel economy performances of different new models driven under the same test conditions. No standardized test can duplicate a person's individual driving habits, EPA said.

In certain cases, apparently identical listings will show different mileage ratings. This occurs because of some factors not shown on this table, such as different types of carburetors. The "D" under the transmission column represents diesel engines.

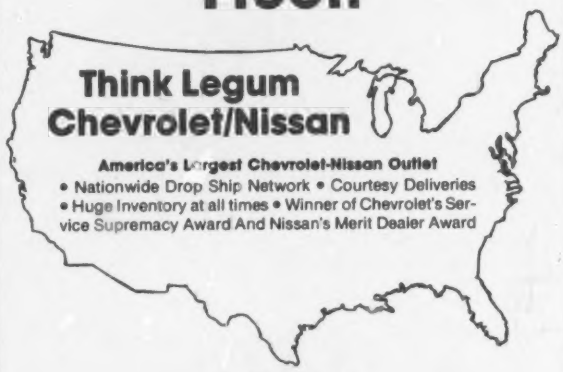
MPG	Make	Trans-mission	CID	Cyl.
	Two-Seaters			
23	Alfa R Spdr 2000 Vel	M5	120	4
16	Chevy Corvette	M4	350	8
16	Chevy Corvette	A4	350	8
22	Datsun Nissan 300ZX	M5	181	6
20	Datsun Nissan 300ZX	M5	181	6
19	Datsun Nissan 300ZX	A4	181	6
27	Ford EXP	M5	98	4
27	Ford EXP	A3	98	4
51	Honda Civic Coupe	M5	82	4
36	Honda Civic Coupe	M5	91	4
32	Honda Civic Coupe	A3	91	4
19	Mazda RX-7	M5	70	2
19	Mazda RX-7	A4	70	2
18	Mercedes Benz 380SL	A4	234	8
26	Pontiac Fiero	M4	151	4
27	Pontiac Fiero	A3	151	4
	Mini-Compact Cars			
21	Alfa R GTV	M5	152	6
20	Porsche 911SC	M5	193	6
17	Porsche 928S	M5	285	8
17	Porsche 928S	A4	285	8
22	Porsche 944	M5	151	4
21	Porsche 944	A3	151	4
42	Toyota Starlet	M4	79	4
44	Toyota Starlet	M5	79	4
27	VW Rabbit Cnv	M5	109	4
25	VW Rabbit Cnv	A3	109	4
	Sub-Compact Cars			
10	Aston Lagonda	A3	326	8
9	Aston Saloona	M5	326	8
10	Aston Vantage	A3	326	8
22	Audi Coupe GT	M5	131	5
19	Audi Coupe GT	A3	131	5
28	Audi 4000	M5	109	4
24	Audi 4000	A3	109	4
21	Audi 4000 Quattro	M5	136	5
27	BMW 3-Series	M5	108	4
27	BMW 3-Series	A3	108	4
24	Chevy Camaro	M4	151	4
23	Chevy Camaro	M5	151	4
24	Chevy Camaro	A4	151	4
20	Chevy Camaro	M5	173	6
20	Chevy Camaro	A4	173	6
16	Chevy Camaro	M5	305	8
18	Chevy Camaro	A4	305	8
28	Chevy Cavalier Cnv	M4	121	4
27	Chevy Cavalier Cnv	M5	121	4
23	Chevy Cavalier Cnv	A3	121	4
31	Chevy Chevette	M4	98	4
31	Chevy Chevette	M5	98	4
30	Chevy Chevette	A3	98	4
43	Chevy Chevette	D-M5	111	4
37	Chevy Chevette	D-A3	111	4
24	Chrysler Laser	M5	135	4
22	Chrysler Laser	M5	135	4
25	Chrysler Laser	A3	135	4
22	Chrysler Laser	A3	135	4
24	Chrysler Lebaron Cnv	A3	135	4
22	Chrysler Lebaron Cnv	A3	135	4
23	Chrysler Lebaron Cnv	A3	156	4
23	Datsun Nissan Maxima	M5	146	6
23	Datsun Nissan Maxima	A4	146	6
35	Datsun Nissan Pulsar/NX	M5	98	4
30	Datsun Nissan Pulsar/NX	A3	98	4
35	Datsun Nissan Sentra	M5	98	4
30	Datsun Nissan Sentra	A3	98	4
50	Datsun Nissan Sentra	D-M4	103	4
43	Datsun Nissan Sentra	D-M5	103	4
38	Datsun Nissan Sentra	D-A3	103	4
28	Datsun 200SX	M5	120	4
21	Datsun 300ZX 2+2	M5	181	6
20	Datsun 300ZX 2+2	M5	181	6
19	Datsun 300ZX 2+2	A4	181	6
34	Dodge Charger	M4	97	4
27	Dodge Charger	M5	135	4
26	Dodge Charger	A3	135	4
41	Dodge Colt	M4	86	4
37	Dodge Colt	M4x2	86	4
31	Dodge Colt	A3	98	4
30	Dodge Colt	M4x2	98	4
21	Dodge Conquest	M5	156	4
21	Dodge Conquest	A4	156	4
24	Dodge Daytona	M5	135	4
22	Dodge Daytona	M5	135	4
25	Dodge Daytona	A3	135	4
22	Dodge Daytona	A3	135	4
24	Dodge 600 Cnv	A3	135	4
22	Dodge 600 Cnv	A3	135	4
23	Dodge 600 Cnv	A3	156	4
34	Ford Laser*	M4	91	4
31	Ford Laser*	A3	91	4
24	Ford Mustang	M4	140	4
23	Ford Mustang	A3	140	4
21	Ford Mustang	M5	140	4

*Available in Puerto Rico only.

(Continued on page 8)

MPG	Make	Trans-mission	CID	Cyl.
32	Honda Accord	M5	112	4
29	Honda Accord	A4	112	4
42	Honda Civic	M4	82	4
35	Honda Civic	M5	91	4
30	Honda Civic	A3	91	4
27	Isuzu I-Mark	M5	111	4
26	Isuzu I-Mark	A3	111	4
44	Isuzu I-Mark	D-M4	111	4
39	Isuzu I-Mark	D-M5	111	4
34	Isuzu I-Mark	D-A3	111	4
24	Isuzu Impulse	M5	119	4
24	Isuzu Impulse	A4 (OD)	119	4
17	Jaguar XJ	A3	258	6
14	Jaguar XJS	A3	326	12
24	Lincoln Mercury Capri	M4	140	4
23	Lincoln Mercury Capri	A3	140	4
21	Lincoln Mercury Capri	M5	140	4
34	Mazda GLC	M4	91	4
35	Mazda GLC	M5	91	4
31	Mazda GLC	A3	91	4
35	Merc Benz	D-M5	134	4
34	Merc Benz	D-M5	134	4
35	Merc Benz	D-A4	134	4
34	Merc Benz	D-A4	134	4
23	Merc Benz	M5	140	4
23	Merc Benz	A4	140	4
25	Mitsubishi Cordia	M5	110	4
29	Mitsubishi Cordia	M5	122	4
28	Mitsubishi Cordia	A3	122	4
41	Mitsubishi Precis*	M4	86	4
37	Mitsubishi Precis*	M4x2	86	4
31	Mitsubishi Precis*	A3	98	4
30	Mitsubishi Precis*	M4x2	98	4
21	Mitsubishi Starion	M5	156	4

Think fast on your Fleet.



Think Legum Chevrolet/Nissan

America's Largest Chevrolet-Nissan Outlet

• Nationwide Drop Ship Network • Courtesy Deliveries • Huge Inventory at all times • Winner of Chevrolet's Service Supremacy Award And Nissan's Merit Dealer Award

The Fleet Elite

Over 85 years of combined fleet experience
Ray Smith • Del Haines • Jack Rosenbaum
Debbie Byer • Linda Krach
We have the staff and financial strength to handle any size fleet order.

LEGUM CHEVROLET/NISSAN
7900 EASTERN AVENUE • BELTWAY EXIT 38 WEST
BALTIMORE, MD 21224
(301) 288-2534
Your Direct Fleet Connection

62 years in business means more national and local fleets continue to use Legum

MPG	Make	Trans-mission	CID	Cyl.
21	Mitsubishi Starion	A4	156	4
25	Mitsubishi Tredia	M5	110	4
29	Mitsubishi Tredia	M5	122	4
29	Mitsubishi Tredia	M4x2	122	4
28	Mitsubishi Tredia	A3	122	4
41	Plymouth Colt	M4	86	4
37	Plymouth Colt	M4x2	86	4
31	Plymouth Colt	A3	98	4
30	Plymouth Colt	M4x2	98	4
21	Plymouth Conquest	M5	156	4
21	Plymouth Conquest	A4	156	4
34	Plymouth Turismo	M4	97	4
27	Plymouth Turismo	M5	135	4
26	Plymouth Turismo	A3	135	4
24	Pontiac Firebird	M4	151	4
25	Pontiac Firebird	M5	151	4
24	Pontiac Firebird	A4	151	4
20	Pontiac Firebird	M5	173	6
20	Pontiac Firebird	A4	173	6
16	Pontiac Firebird	M5	305	8
18	Pontiac Firebird	A4	305	8
31	Pontiac 1000	M4	98	4
31	Pontiac 1000	M5	98	4
30	Pontiac 1000	A3	98	4
43	Pontiac 1000	D-M5	111	4
37	Pontiac 1000	D-A3	111	4
29	Pontiac 2000 Sunbird Cnv	M5	110	4
27	Pontiac 2000 Sunbird Cnv	A3	110	4
26	Renault Fuego	M5	95	4
9	Rolls-Royce Corniche	A3	412	8
34	Subaru	M4	97	4
32	Subaru	M5	97	4
30	Subaru	M5	109	4
27	Subaru	A3	109	4
30	Subaru	M5	109	4
27	Subaru	A3	109	4
26	Toyota Celica	M5	144	4
25	Toyota Celica	A4	144	4
21	Toyota Celica Supra	M5	168	6
22	Toyota Celica Supra	A4	168	6
32	Toyota Corolla Sport	M5	97	4
30	Toyota Corolla Sport	A4	97	4
21	Toyota Cressida	M5	168	6
22	Toyota Cressida	A4	168	6
39	Toyota Tercel	M4	89	4
34	Toyota Tercel	M5	89	4
33	Toyota Tercel	A3	89	4
43	Volkswagen Jetta	D-M5	97	4
41	Volkswagen Jetta	D-M5	97	4
30	Volkswagen Jetta	M5	105	4
25	Volkswagen Jetta	A3	105	4
27	Volkswagen Jetta	M5	109	4
47	Volkswagen Rabbit	D-M4	97	4
44	Volkswagen Rabbit	D-M5	97	4
31	Volkswagen Rabbit	M4	105	4
31	Volkswagen Rabbit	M5	105	4
26	Volkswagen Rabbit	A3	105	4
26	Volkswagen Rabbit	M5	109	4
27	Volkswagen Scirocco	M5	109	4
25	Volkswagen Scirocco	A3	109	4
	Compact Cars			
16	Buick Riviera Cnv	A4	252	6
17	Buick Riviera Cnv	A4	307	8
29	Buick Skyhawk	M5	110	4
27	Buick Skyhawk	A3	110	4
28	Buick Skyhawk	M4	121	4
28	Buick Skyhawk	A3	121	4
25	Buick Skylark	M4	151	4
25	Buick Skylark	A3	151	4
21	Buick Skylark	M4	173	6
21	Buick Skylark	A3	173	6
27	Cadillac Cimarron	M5	121	4

(Continued on page 10)

MPG	Make	Trans-mission	CID	Cyl.
23	Cadillac Cimarron	A3	121	4
17	Cadillac Eldorado Cnv	A4	249	8
28	Chevy Cavalier	M4	121	4
30	Chevy Cavalier	M4	121	4
27	Chevy Cavalier	M5	121	4
28	Chevy Cavalier	A3	121	4
31	Datsun Nissan Stanza	M5	120	4
27	Datsun Nissan Stanza	A3	120	4
34	Dodge Omni	M4	97	4
28	Dodge Omni	M5	135	4
26	Dodge Omni	A3	135	4
37	Ford Escort	M4	98	4
27	Ford Escort	M5	98	4
27	Ford Escort	A3	98	4
28	Ford Escort	M5	98	4
27	Ford Escort	A3	98	4
41	Ford Escort	M5	122	4
46	Ford Escort	D-M5	122	4
41	Ford Tempo	M5	122	4
27	Ford Tempo	M5	140	4
25	Ford Tempo	A3	140	4
21	Thunderbird	M5	140	4
20	Thunderbird	A3	140	4
20	Thunderbird	A3	231	6
21	Thunderbird	A4	231	6
18	Thunderbird	A4	302	8
21	Merc Cougar	M5	140	4
20	Merc Cougar	A3	140	4
20	Merc Cougar	A3	231	6
21	Merc Cougar	A4	231	6
18	Merc Cougar	A4	302	8
37	Linc-Merc Lynx	M4	98	4
27	Linc-Merc Lynx	M5	98	4
27	Linc-Merc Lynx	A3	98	4
28	Linc-Merc Lynx	M5	98	4
27	Linc-Merc Lynx	A3	98	4
41	Linc-Merc Lynx	M5	122	4
46	Linc-Merc Lynx	D-M5	122	4
41	Linc-Merc Topaz	M5	122	4
27	Linc-Merc Topaz	M5	140	4
25	Linc-Merc Topaz	A3	140	4
29	Mazda 626	M5	122	4
27	Mazda 626	A3	122	4
40	Mazda 626	D-M5	122	4
26	Mer Benz 300D/300CD	A4	183	5
27	Mer Benz 300D/300CD	A4	183	5
26	Mer Benz 300SD/380SE	A4	183	5
27	Mer Benz 300SD/380SE	D-A4	183	5
18	Mer Benz 300SD/380SE	A4	234	8
15	Mer Benz 500SE	A4	303	8
29	Olds Firenza	M5	110	4
27	Olds Firenza	A3	110	4
28	Olds Firenza	M4	121	4
27	Olds Firenza	M5	121	4
28	Olds Firenza	A3	121	4
27	Olds Omega	M4	151	4
25	Olds Omega	A3	151	4
21	Olds Omega	M4	173	6
21	Olds Omega	A3	173	6
22	Peugeot 505	M5	120	4
21	Peugeot 505	A3	120	4
28	Peugeot 505	D-M5	141	4
27	Peugeot 505	D-A3	141	4
28	Peugeot 604 Turbo	D-M5	141	4
27	Peugeot 604 Turbo	D-A3	141	4
34	Plymouth Horizon	M4	97	4
28	Plymouth Horizon	M5	135	4
26	Plymouth Horizon	A3	135	4
29	Pontiac 2000	M5	110	4
32	Pontiac 2000	M5	110	4
27	Pontiac 2000	A3	110	4
28	Pontiac 2000	M4	121	4
38	Renault Alliance	M4	85	4
34	Renault Alliance	M5	85	4
28	Renault Alliance	A3	85	4
9	Rolls Royce Camargue	A3	412	8
23	Saab 900	M5	121	4
21	Saab 900 Turbo	M5	121	4
21	Saab 900	A3	121	4
20	Saab 900	A3	121	4
38	Toyota Camry	D-M5	112	4
32	Toyota Camry	M5	122	4
30	Toyota Camry	A4	122	4
34	Toyota Corolla	M5	97	4
32	Toyota Corolla	A3	97	4
47	Toyota Corolla	D-M4	112	4
43	Toyota Corolla	D-M5	112	4
38	Toyota Corolla	D-A3	112	4
42	Volkswagen Quantum	D-M5	97	4
32	VW Quantum (Turbo)	D-A3	97	4
20	Volkswagen Quantum	A3	131	5
20	Volvo DL/GL/Turbo	M5	130	4
20	Volvo DL/GL/Turbo	A4	130	4
25	Volvo DL/GL/Turbo	M5	141	4
23	Volvo DL/GL/Turbo	A4	141	4
30	Volvo DL/GL/Turbo	D-M5	145	6
28	Volvo DL/GL/Turbo	D-A3	145	6

Mid-Size Cars

22	Audi 5000S	M5	131	5
19	Audi 5000S	A3	131	5
25	Buick Century	A3	151	4
21	Buick Century	A3	181	6
27	Buick Century	D-A3	263	6
21	Buick Regal	A3	231	6
18	Buick Regal	A4	252	6
25	Buick Regal	D-A4	263	6
23	Buick Regal	D-A4	350	6
16	Buick Riviera	A4	252	6
17	Buick Riviera	A4	307	8
22	Buick Riviera	A4	350	8
18	Cadillac Eldorado	A4	249	8
22	Cadillac Eldorado	D-A4	350	8
18	Cadillac Seville	A4	249	8
22	Cadillac Seville	D-A4	350	8
25	Chevy Celebrity	M4	151	4
25	Chevy Celebrity	A3	151	4
21	Chevy Celebrity	A3	173	6
27	Chevy Celebrity	D-A3	263	6
27	Chevy Citation II	M4	151	4
25	Chevy Citation II	A3	151	4
21	Chevy Citation II	M4	173	6
21	Chevy Citation	A3	173	6
20	Chevy Monte Carlo	A3	229	6
20	Chevy Monte Carlo	A4	229	6
17	Chevy Monte Carlo	A3	305	8
18	Chevy Monte Carlo	A4	305	8
23	Chevy Monte Carlo	D-A3	350	8
23	Chevy Monte Carlo	D-A4	350	8
25	Chry New Yorker	A3	135	4
22	Chry New Yorker	A3	135	4
23	Chry New Yorker	A3	156	4
21	Chry Executive	A3	156	4
22	Chry Lebaron	M5	135	4
25	Chry Lebaron	A3	135	4
22	Chry Lebaron	A3	135	4
23	Chry Lebaron	A3	156	4
17	Chry Newport 5th Ave.	A3	318	8
29	Dodge Aries	M4	135	4
27	Dodge Aries	M5	135	4
26	Dodge Aries	A3	135	4
23	Dodge Aries	A3	156	4
17	Dodge Diplomat	A3	318	8
27	Dodge 600	M5	135	4
26	Dodge 600	A3	135	4
24	Dodge 600	M5	135	4

(Continued on page 12)

MPG	Make	Trans-mission	CID	Cyl.
22	Dodge 600	M5	135	4
25	Dodge 600	A3	135	4
22	Dodge 600	A3	135	4
23	Dodge 600	A3	156	4
23	Ford LTD	A3	140	4
20	Ford LTD	A3	231	6
21	Ford LTD	A4	231	6
25	Linc-Merc Continental	A4	149	6
17	Linc-Merc Continental	A4	302	8
25	Linc-Merc Mark VII	A4	149	6
17	Linc-Merc Mark VII	A4	302	8
23	Linc-Merc Marquis	A3	140	4
20	Linc-Merc Marquis	A3	231	6
21	Linc-Merc Marquis	A4	231	6
15	Mer Benz 500SEL	A4	303	8
25	Olds Cutlass Ciera	A3	151	4
21	Olds Cutlass Ciera	A3	181	6
28	Olds Cutlass Ciera	D-A3	263	6
21	Olds Cutlass Supreme	A3	231	6
26	Olds Cutlass Supreme	D-A3	263	6
25	Olds Cutlass Supreme	D-A4	263	6
18	Olds Cutlass Supreme	A3	307	8
18	Olds Cutlass Supreme	A4	307	8
23	Olds Cutlass Supreme	D-A3	350	8
23	Olds Cutlass Supreme	D-A4	350	8
16	Olds Toronado	A4	252	6
17	Olds Toronado	A4	307	8
22	Olds Toronado	A4	350	8
17	Plymouth Gran Fury	A3	318	8
29	Plymouth Reliant	M4	135	4
27	Plymouth Reliant	M5	135	4
26	Plymouth Reliant	A3	135	4
23	Plymouth Reliant	A3	156	4
21	Pontiac Bonneville	A3	231	6
17	Pontiac Bonneville	A3	305	8
18	Pontiac Bonneville	A4	305	8
23	Pontiac Bonneville	D-A3	350	8
23	Pontiac Bonneville	D-A4	350	8
21	Pontiac Grand Prix	A3	231	6
17	Pontiac Grand Prix	A3	305	8
18	Pontiac Grand Prix	A4	305	8
23	Pontiac Grand Prix	D-A3	350	8
23	Pontiac Grand Prix	D-A4	350	8
25	Pontiac Phoenix	A3	151	4
21	Pontiac Phoenix	M4	173	6
21	Pontiac Phoenix	A3	173	6
25	Pontiac 6000	A3	151	4
21	Pontiac 6000	A3	173	6
27	Pontiac 6000	D-A3	263	6
10	Rolls Sil Spirit	A3	412	8
28	Volvo 760 GLE	D-M5	145	6
26	Volvo 760 GLE	D-A4	145	6
20	Volvo 760 GLE	A4	174	6
	Large Cars			
17	Buick Electra	A4	252	6
17	Buick Electra	A4	307	8
23	Buick Electra	D-A4	350	8
19	Buick LeSabre	A3	231	6
17	Buick LeSabre	A4	252	6
17	Buick LeSabre	A3	307	8
17	Buick LeSabre	A4	307	8
23	Buick LeSabre	D-A4	350	8
23	Cad. De Ville-Br.	D-A4	350	8
17	Cad. De Ville-Br.	A4	249	8
19	Chevy Impala/Caprice	A3	229	6
17	Chevy Impala/Caprice	A4	305	8
23	Chevy Impala/Caprice	D-A3	350	8
23	Chevy Impala/Caprice	D-A4	350	8
17	Ford LTD Cr. Vic.	A4	302	8
17	Linc-Merc Gr Marquis	A4	302	8
17	Linc-Mercury Town Car	A4	302	8
19	Olds Delta 88	A3	231	6
17	Olds Delta 88	A3	307	8
17	Olds Delta 88	A4	307	8
23	Olds Delta 88	D-A3	350	8
23	Olds Delta 88	D-A4	350	8
17	Olds Ninety-Eight	A4	307	8
23	Olds Ninety-Eight	A4	350	8
19	Pontiac Parisienne	A3	231	6
17	Pontiac Parisienne	A4	305	8
23	Pontiac Parisienne	D-A3	350	8
23	Pontiac Parisienne	D-A4	350	8
	Small Station Wagons			
29	Buick Skyhawk Wagon	M5	110	4
27	Buick Skyhawk Wagon	A3	110	4
26	Buick Skyhawk Wagon	M4	121	4
23	Buick Skyhawk Wagon	A3	121	4
28	Chevy Cavalier Wagon	M4	121	4
27	Chevy Cavalier Wagon	M5	121	4
28	Chevy Cavalier Wagon	A3	121	4
22	Datsun Nissan Maxima	A4	146	6
35	Datsun Nissan Sentra	M5	98	4
30	Datsun Nissan Sentra	A3	98	4
42	Datsun Nissan Sentra	D-M5	103	4
38	Datsun Nissan Sentra	D-A3	103	4
28	Dodge Colt Vista	M5	122	4
28	Dodge Colt Vista	M4x2	122	4
27	Dodge Colt Vista	A3	122	4
27	Ford Escort Wagon	M5	98	4
27	Ford Escort Wagon	A3	98	4
28	Ford Escort Wagon	M5	98	4
26	Ford Escort Wagon	A3	98	4
41	Ford Escort Wagon	M5	122	4
34	Honda Civic Wagon	M5	91	4
30	Honda Civic Wagon	A3	91	4
27	Linc-Merc Lynx Wagon	M5	98	4
27	Linc-Merc Lynx Wagon	A3	98	4
41	Linc-Merc Lynx Wagon	M5	122	4
28	Mazda GLC Wagon	M4	91	4
28	Mazda GLC Wagon	M5	91	4
25	Mazda GLC Wagon	A3	91	4
26	Mitsubishi Space*	M5	122	4
28	Mitsubishi Space*	M4x2	122	4

(Continued on page 77)

EPA Car Categories

Mini-Compact — Less than 85 cubic feet of passenger and luggage volume.

Sub-Compact: Between 85 to 100 cubic feet of passenger and luggage volume.

Compact: Between 100 to 110 cubic feet of passenger and luggage volume.

Mid-Size Cars: Between 110 to 120 cubic feet of passenger and luggage volume.

Large Cars: More than 120 cubic feet of passenger and luggage volume.

NAFA Car Categories

Sub-Compact: Wheelbase of less than 99 inches and a curb weight of under 2,199 pounds.

Compact: Wheelbase between 100 and 104 inches and a curb weight of between 2,200 and 2,599 pounds.

Mid-Size Cars: Wheelbase between 105 and 108 inches with a curb weight of between 2,600 and 3,199 pounds.

Large Cars: Wheelbase of more than 108 inches and a curb weight of more than 3,200 pounds.

Pribish on Computer Technology:

Fog, Spit and Spray

In his presentation, "Fog, Spit and Spray," at NAFA'S 1983 Annual Conference, Al Pribish of the Michigan Career Institute said, "For long enough now, the intimidation of technology has defied the fleet administrator to 'catch up.' What appears to be an impossible task emerges to be a delicious challenge! Now that the computer has become the mistress to the automobile (or is it vice versa?), we are beginning to comprehend its challenge — a most compatible union with virtually unlimited potential.

"Just as the magic of 'word processing,' 'data storage,' and 'memory' began to take on new meaning, so will words like 'closed loop feedback,' 'throttle body injection,' and 'diagnostic readout.'

"With the following presentation, I offer the 'state of the art' from the fleet administrator's point of view along with the assurance that these things are not out of reach."

Early fuel supply and mixing systems cared little about the price of petroleum or fuel economy. They were "gravity feed gas drippers." The fuel tank was higher than the mixer and liquid ran downhill from high to low and dropped out at a rate determined by an "adjustable leak." These "leaky faucet" fuel systems did what was needed, but not what was wanted.

All liquid fuel mixing devices, whether they are carburetor or injector, are fundamentally studies in "basketballs and pepper specks — basketballs of air and pepper specks of liquid gasoline." These are blended by the carburetor to make a hair spray or bug spray or paint spray mist. Once the mist gets into the engine rather than liquid being drawn into the cylinder, we hope the liquid pepper specks will evaporate or turn into a gas or fog. This 'fog' is the stuff the engine runs on.

The relationship of basketballs of air to pepper specks of gasoline is important, and varies for different driving conditions. At idle, it is about 13 pepperspecks to 1 basketball. To accelerate, it is about 4 to 1 (more like 16 to 4 or even 160 to 40). To cruise, the ratio is about 15 to 1. The business of relationships, or how many pepperspecks there are to basketballs, is called the "air fuel ratio" and is a very popular issue these days.

The popularity is well founded in that it is the direction we have chosen to achieve government emission and mileage requirements. By very closely controlling basketballs and pepper specks, regardless of how many (for example, 15 to 1, 30 to 2, 45 to 3, or 1500 to 100) the manufacturers have really done a job in producing cars with better and better mileage. They are cleaner as well. The computer deserves the thanks for this achievement.

The means to do this is uses a feedback principle. The exhaust or waste is sampled as it comes out of the engine. From that sampling the computer is asked to correct the mix of air and fuel until the waste sampling is what it should be. The feedback, or "I'll make another adjustment when I see how the last adjustment does," is called "closed loop feedback." (In computer language it is "cybernetics.")

In a vehicle with an electronically-controlled carburetor, the computer will adjust the carburetor to maintain the proper mix of "basketballs and pepper specks" when a signal is received from the feedback device. Electronically, this control is for the quality of the air/fuel mixture. The quantity of the mix is still controlled by the driver's foot.

Gasoline engine injection systems "spit" pepper specks (untimed) into the breathing or intake manifold with low pressure (10 to 60 psi), whereas diesel systems are timed and spit directly into the fire chamber at a very high pressure (1,000 to 5,000 psi).

All diesel injectors are "windex bottles" or "water pistols." Gasoline injectors are "push button drinking fountains" or "kitchen faucets."

There are two varieties of gasoline fuel injection systems. Those that "spit" pepper specks into the center of the engine manifold right where the carburetor used to be are called "central injection" or "throttle body injection." They involve one "spitter" or a pair of "spitters" centrally located right under the air cleaner.

The second type uses a separate "spitter" for each of the engine's cylinders. They are located at each of the cylinders in the intake manifold where

(Continued on page 26)

Fog, Spit and Spray

(Continued from page 24)

the basketballs of air are when on their way to the cylinders. This is called "port injection."

Whether central or port (individual injectors), all injector systems work in one of two ways. They are:

1. Electrically turned on or off (like an electric spitter).
2. Hydraulically sprayed where the spray rather than spit) is continuous and increase or decreases by changing the spray pressure. Both systems depend on the use of an on-board computer.

The delivery for all gasoline injected fuel, whether central throttle body or individual port, is accomplished by an electric fuel pump usually located in or near the gasoline tank.

Throttle Body Injection

The Throttle Body Injection (TBI) assemblies utilize one or two electrically actuated fuel injectors which, when actuated, spray a calculated quantity of fuel into the engine intake manifold. The injector is mounted on the throttle body over the throttle valve with the metering tip pointed into the throttle bores.

The TBI system provides a means of fuel distribution for controlling exhaust emissions within legislated limits by precisely controlling the air/fuel mixture under all operating conditions for, as near as possible, complete combustion. The TBI assembly can accomplish this by using an Electronic Control Module (ECM) that receives electrical inputs from various sensors concerning engine operating conditions, refers to pre-established computer programs, performs high speed calculations of fuel requirements, and signals the injectors to provide the precise amount of fuel required.

Throttle Position Sensor

One of the sensors is mounted directly on the TBI unit. The Throttle Position Sensor (TPS) is an electrical variable resistor mounted to the throttle body at the end of the throttle shaft opposite the throttle lever and is electrically connected to the wiring harness with the ECM. (Moves when the gas pedal moves.)

A lever on the end of the throttle shaft rotates with accelerator pedal linkage movement opening or closing the throttle valve and rotating the lever on the TPS. The throttle shaft and lever movement (from closed throttle up to a certain degree of rotation) is converted to an electrical signal by the TPS sensor, and the signal is then transmitted to the ECM. The signal consists of a voltage output from the TPS sensor which is compared to the voltage input to the TPS sensor (which originates from the ECM). The ECM uses the signal (voltage output/voltage input) as a reference point of throttle position in determining calculations of air/fuel mixture to the TBI unit as required for the particular situation.

Idle Air Control Valve (Automatically speeds up the idle without stepping on the gas pedal)

The Idle Air Control Valve (IACV) is an electrical stepping motor which controls the positioning of a valve that regulates clean air going to the engine, by-passing the throttle valve. The ECM supplies an electrical pulse to the stepping motor to increase or decrease the amount of air flowing by the valve to control engine idle speed, depending on the engine operating conditions.

The basic purpose of the idle air control valve is to control engine idle speed during all periods of closed throttle operation. It performs this function during cold and hot operating modes as well as compensating for additional loads (such as transmission engaged, air conditioning clutch engaged, varying alternator loads) placed on the engine that can affect engine idle speeds.

The normal engine idle speed is programmed into the ECM and no adjustments are possible. Under normal operating conditions, idle speed is maintained by monitoring idle speed in a "closed loop" fashion.

Pressure Regulator (A spring loaded 'pop-oven' device)

The fuel supply system is made up of an electric motor-driven fuel pump, a full-flow fuel filter, a fuel pressure regulator, fuel supply and return lines, and either one or two fuel injectors. Fuel is pumped through the in-line fuel filter to the pressure regulator in the TBI assembly. The TBI injectors supply fuel to the engine's cylinders in precisely timed "bursts" as a result of the electrical signals received from the ECM. Excess fuel is returned to the fuel tank through the fuel return line.

The precision of the fuel supply system is greatly influenced by the fuel pressure regulator which is permanently set at the factory to control fuel to plus or minus one-half percent. The fuel pressure regulator is integrated with the fuel meter cover in the TBI assembly. The regulator contains an air chamber and a fuel chamber separated by a diaphragm-operated relief valve and a calibrated spring.

Fuel pressure is regulated by the difference between fuel pump pressure acting on one side of the diaphragm and the force of the calibrated relief valve spring acting on the other side of the diaphragm. This difference controls the diaphragm relief valve, opening or closing an orifice in the fuel chamber to control the amount of fuel returned to the fuel tank through the fuel return line, thereby regulating fuel pressue. Fuel inlet pressure is regulated by the calibrated spring at a nominal 10 psi (higher on some cars). Atmospheric pressure, acting on the spring side of the diaphragm, changes fuel inlet pressure to compensate for barometric pressure changes, both at sea level and at higher altitudes.

(Continued on page 28)

Fog, Spit and Spray

(Continued from page 26)

Injectors

Because fuel injectors are located in the main body directly above the throttle valves, the TBI system operates at a relatively low fuel pressure (10-15 psi) at the injector inlet but at a high enough pressure (10 psi) at the injector nozzle to obtain good fuel atomization.

Also, fuel is supplied to the injector inlet through a cast-in ring that surrounds the injector body to reduce vapor formation in the fuel system during periods of extended hot operation.

The injector body contains a solenoid switch which, on receiving an electrical signal from the ECM, pulls the plunger or core piece upward, allowing the spring-loaded ball valve to come off the valve seat, thereby allowing fuel to flow through to the atomizer/spray nozzle. Since the pressure of the valve is constant, the volume of fuel flow is changed by varying the time the injector is held open. This function is performed by the ECM.

Catalytic Converter

The working of a two-stage catalytic converter involves a Microprocessor Control Unit (MCU). The MCU system's capacity for reducing vehicle emissions is due mainly to the use of a two-stage catalytic converter. After the catalytic converter receives the exhaust gases from the engine, it reduces nitrogen oxides into separate elements of nitrogen and oxygen in the first stage and completes the combustion of carbon monoxide and unburned gases in its second stage.

Emission Requirements (Grams/Mile)

(Passenger Cars)

Model	Hydrocarbon (HC)		Carbon Monoxide (CO)		Oxides of Nitrogen (NOx)	
Year	California	Federal	California	Federal	California	Federal
1978	0.41	1.5	9.0	15.0	1.5	2.0
1979	0.41	0.41	9.0	15.0	1.5	2.0
1980	0.39	0.41	9.0	7.0	1.0	2.0
1981	0.39	0.41	7.0	3.4	0.7	1.0
1982	0.39	0.41	7.0	3.4	0.4	1.0
1983	0.39	0.41	7.0	3.4	0.4	1.0
1960 (No Control)		10.6		84		4.1

"The 'air fuel ratio' is the relationship between pepper specks of fuel and basketballs of air; at idle it is about 13 pepper specks to one basketball."

Secondary air from the Thermactor air pump is injected into the catalytic converter's mixing chamber to aid in the converter's second stage combustion. The distribution of secondary air from the Thermactor air pump is an important function of the MCU system.

Another equally significant function of the MCU system is to closely regulate the carburetor's air/fuel mixture, because the composition of exhaust gases leaving the engine to enter the two-stage catalytic converter must be within narrower limits than what was acceptable for the earlier single-stage converter.

The Reasons Why

Since the early 1960's automobile manufacturers have used many methods to meet increasingly stringent air pollution standards. These started with positive crankcase ventilation (PCV) valves, and have progressed to air pumps, fuel line purge canisters, EGR, catalytic converters, and adjustments in engine compression ratios, timing, and carburetion. The increasing severity of emission control standards is shown in the table above.

Unfortunately, these efforts to control and improve emissions usually resulted in lower or poorer fuel economy. By 1985, the manufacturers must obtain a corporate average fuel economy (CAFE) of 27.5 miles per gallon, which is more than a 100 percent increase over the average fuel economy in 1973. The alternative is to be fined $5.00 for each 1/10 of a mile over the mandated standard times the number of vehicles!! ■

What You Don't Know About Big Bast Fleet Sales Could Be Costing You Money!

Here are some people Who can help you ...

CHARLES BAST
BOB HASSETT
JOE CAVALIERI
SUSAN LAMBERSON

For over 50 years Big Bast has been an active and growing force in Chevrolet Fleet Sales. Our success is based on providing you with the finest service available.

Chevrolet

BIG BAST

Sunrise H'way/Oyster Bay Expressway
Sealord, New York

516-785-4100

Taxable Benefits

(Continued from page 30)

will have to include in income the personal portion of operating expenses paid for by the employer. Therefore, having an automobile available for use and actually using it for personal purposes will necessitate two separate taxable benefit calculations.

Operating Expenses — Any expenses paid by the employer that relate to the operation of the automobile for the employee's personal use (or that of a related person) will be included in his income to the extent that the employer is not reimbursed.

According to Revenue Canada, they will consider such operating costs to include all costs directly related to the driving of the automobile such as licenses, insurance, repairs, gasoline, oil, and servicing charges for spring and fall preventive maintenance insepctions. The operating expense benefit is therefore intended to be calculated as follows:

$$\frac{\text{Kilometers of Personal Use}}{\text{Total Kilometers}} \times \text{Operating Expenses} = \text{Initial Benefit}$$

$$\frac{\text{Initial Amounts Reimbursed}}{\text{Benefits — By Employee}} = \text{Taxable Benefit}$$

Standby Charge — The new increased standby charge must now be computed whenever an automobile is made "available" by an employer to an employee "by virtue of his employment." With the word "available" having common dictionary definitions such as "capable of being used, at one's disposal, within one's reach," there would appear to be little doubt that most automobiles supplied by employers will fall under the standby charge provisions. If the employee breaks his employer's rules prohibiting the car's use for personal purposes, there may be an argument that any benefit is not received "by virtue of employment" since it would be received outside of the terms and conditions of employment. However, this argument will undoubtedly be challenged by the tax authorities.

Where the employee (or persons related to him) drives the car for more than 1,000 kilometers per month for personal purposes, the full standby charge of 2% per month of cost or two-thirds of leasing costs will apply. This charge may only be reduced where personal use is less than 1,000 kilometers a month (12,000/year).* In such cases the standby charge is calculated as:

$$\frac{\text{Number of kilometers of personal Use (cannot exceed 1,000/month)}}{1{,}000 \text{ kilometers}} \times \text{number of months available} \times \text{Full Standby Charge} = \text{Reduced Standby Charge}$$

Since personal use operating expenses paid by the employer are separately included in income, the standby charge, whether the "full" or "reduced" version, may be decreased by any amounts paid to the employer by the employee (or the person related to the employee) except amounts paid in respect of expenses relating to the operation of the automobile.

(Continued on page 35)

Canadian Operating Costs in ¢/Mile

	1979	1980	1981	1982	First 6 mos. 1983
Mileage Factor — Business	1485	1478	1511	1524	1812
Personal	488	489	482	530	423
Total	1973	1966	1993	2054	2236
Running Expense	8.64	8.93	10.48	11.82	10.51
Standing Expense (Including Interest & Service Fees)	11.15	12.47	15.04	15.52	13.35
Incidental Expense	.98	1.08	1.02	1.16	1.23
Total Expenses	20.77	22.44	26.54	28.50	25.09
Year-to-Year Increase		8%	18.3%	7.4%	12%
Gas Cost/Gallon	1.03	1.20	1.65	2.02	2.06
Year-to-Year Increase		16.5%	37.5%	22.4%	2%

These costs are based on a typical Canadian fleet operating all across Canada. Your fleet may have different costs due to your particular make up, but the year-to-year increases in costs should be similar over the same time frame.

Note: Main Reasons for Drop

1. **15% increase in mpg; dropped gas cost 1¢/m.**
2. **Strong used car market increase; depreciation adjustment by 2¢/m.**
3. **9% increase in miles travelled; reduced standing and incidental expenses per mile cost.**

NAFA's Operating Expense Reports 1980, 1981, 1982

Composite fleet consists of those fleets that do not break out operating expenses by size of car, but only submit totals for the entire fleet.	1980 Composite Fleet	1981 Composite Fleet	1982 Composite Fleet
Average Miles per Month	**1,897**	**1,822**	**1,880**
OPERATING EXPENSES (Expressed in pennies per car per mile)			
Fuel	.0715	.0745	.0643
Oil	.0012	.0012	.0011
Tires & Tire Repair	.0066	.0059	.0057
Repair & Maintenance	.0132	.0142	.0150
Total Operating Expenses	.0925	.0958	.0861
INCIDENTAL EXPENSES (Expressed in dollars per car per month)			
License & Taxes	$ 9.07	$ 6.23	$ 8.63
Accident Repairs — Less Recoveries	8.90	8.65	7.39
Washing	3.24	5.04	6.14
Parking & Tolls	11.50	16.48	12.09
Miscellaneous	1.23	3.29	2.98
Total Incidental Expenses	$ 33.94	$ 39.69	$ 37.23
STANDING EXPENSES (Expressed in dollars per car per month)			
Interest or Service Charge	$ 51.46	$ 74.86	$ 76.38
Depreciation Reserve	120.95	154.89	161.37
Depreciation Adjustment	-16.91	-17.56	-23.06
Selling Expenses	—	1.35	11.38
Insurance	19.16	21.27	23.94
Total Standing Expenses	$174.66	$234.81	$250.01
CREDITS (Dollar return per car per month)			
Total Credits	$ 25.53	$ 43.63	$ 42.28
NET EXPENSES (Incidental expenses plus standing expenses less personal use credit expressed in dollars per car per month)	$183.07	$230.87	$244.96

20 Year History of Fleet Operating Expenses
(in pennies per mile)

1963-1967

	1963	1964	1965	1966	1967
Gasoline	.0222	.0223	.0235	.0247	.0256
Oil	.0009	.0009	.0009	.0009	.0008
Maintenance & Repairs	.0046	.0044	.0046	.0046	.0049
Tires	.0026	.0027	.0028	.0034	.0035
Total Expenses	.0303	.0303	.0317	.0336	.0348
Price of Gasoline	31.7¢	31.7¢	32.4¢	33.2¢	34.2¢
Miles per gallon	14.3	14.2	13.8	13.4	13.3

1968-1972

	1968	1969	1970	1971	1972
Gasoline	.0263	.0278	.0290	.0295	.0301
Oil	.0009	.0008	.0008	.0008	.0008
Maintenance & Repairs	.0055	.0059	.0066	.0078	.0087
Tires	.0042	.0047	.0048	.0057	.0052
Total Expenses	.0369	.0392	.0412	.0438	.0448
Price of Gasoline	34.8¢	36.0¢	36.6¢	36.8¢	36.8¢
Miles per gallon	13.2	12.9	12.6	12.5	12.2

1973-1977

	1973	1974	1975	1976	1977
Gasoline	.0334	.0440	.0466	.0467	.0475
Oil	.0008	.0009	.0010	.0010	.0010
Maintenance & Repairs	.0085	.0103	.0104	.0101	.0106
Tires	.0043	.0057	.0051	.0052	.0051
Total Expenses	.0470	.0609	.0631	.0630	.0642
Price of Gasoline	39.6¢	53.5¢	57.4¢	60.7¢	64.8¢
Miles per gallon	11.8	12.2	13.3	13.0	13.6

1978-1982

	1978	1979	1980	1981	1982
Gasoline	.0474	.0589	.0715	.0745	.0643
Oil	.0009	.0010	.0012	.0012	.0011
Maintenance & Repairs	.0111	.0115	.0132	.0142	.0150
Tires	.0054	.0057	.0066	.0059	.0057
Total Expenses	.0648	.0771	.0925	.0958	.0861
Price of Gasoline	67.8¢	88.9¢	$1.23	$1.32	$1.36
Miles per gallon	14.3	15.6	16.8	17.8	21.1

VAN NESS SALES & SERVICE CORPORATION
CHRYSLER ★ PLYMOUTH ★ DODGE
Alan Green
Fleet Manager
WE WANT YOUR BUSINESS!
• Downtown S.F. Frwy. Access
• 20 min. From Airports
• $500,000 Parts Inventory
• 3 Floors of Service
• 10,000 Sq. Ft. of Modern Body Shop
• Courtesy Delivery
• 6 Full Time Experienced Fleet People
• Drop Shipments
MEMBER
WVLA
1200 Van Ness Avenue • San Francisco, CA 94109
(415) 775-0444
NAPA AFFILIATE

NAFA Safety Survey Results:

Highway Accident Statistics Summary for 1983

For the past three years, NAFA Newsletter has published a monthly report on accident frequency among its members, as reported to the Association.

The following statistics are a summary of the responses for the 12 month period from October 1982 through September 1983:

Number of Fleets Responding: 377
Total Number of Vehicles: 152,775
(average in fleet: 405)
Total Miles Driven: 298,761,859
(average miles driven per month: 1,955)
Total Number of Reportable Accidents*: 2,416
Total Number of Preventable Accidents*: 1,210
Total Number of
Non-Preventable Accidents*: 1,206
Accident Frequency:
Preventable Accidents — 4.05
Non-Preventable Accidents — 4.03
Total Number of Personal Injuries: 215
Total Amount of Damage to Vehicles: $1,488,215

***National Safety Council Definitions**

Reportable Accident: Any accident in which the vehicle is involved, unless properly parked, where such accident results in death, personal injury, or property damage. An accident is reportable regardless of who was hurt, what property was damaged, or who was responsible.

Preventable Accident: Any accident involving a company-provided car which results in property damage or personal injury, regardless of who was injured, what property was damaged, or when it occurred, in which the driver in question failed to exercise every reasonable precaution to prevent the accident.

Accident Frequency Rate: The accident frequency rate is determined by multiplying the number of accident by 1,000,000 and dividing by the total number of miles driven.

WOULDN'T YOU RATHER HAVE GARY BUICK FLEET SERVICE!

GARY FLEET ACTION TEAM:
(Top, left to right) CHRIS A. CAUMARTIN, General Sales Manager – LINDA SAYLES, Office Manager – LES TAXIN, Account Executive.
(Bottom, left to right) CINDIE PARROT, Registration Dept. – SUSAN A. SHORT, Fleet Sales Manager

BUICK FLEET CENTER

- Immediate delivery out of stock
- Factory orders promptly filled
- Courtesy deliveries in greater Los Angeles area
- Nationwide Drop-Shipment Program
- Competitive prices
- Prompt accurate billing
- Centrally located and freeway close to everywhere in Southern California

CALL (213) 842-7181 OR 849-2291

GARY Buick in Burbank

524 SOUTH SAN FERNANDO BOULEVARD
P.O. BOX 4138 / BURBANK, CA. 91503

NAFA AFFILIATE

GM QUALITY SERVICE PARTS GM
GENERAL MOTORS PARTS DIVISION

NORTH AMERICAN PROFESSIONAL DRIVER EDUCATION ASSOCIATION, INC.
4935 W. Foster Ave., Chicago, IL 60630
(312) 777-9605
Patrick Barrett, President

RUBBER MANUFACTURERS ASSOCIATION
1901 Pennsylvania Avenue, N.W., Washington, D.C. 20006
(202) 785-2602
Donald G. Brotzman, President

RUNZHEIMER AND COMPANY, INC.
Runzheimer Park, Rochester, WI 53167
(414) 534-3121
Peter D. Packer, Vice President, Communications

SOCIETY OF AUTOMOTIVE ENGINEERS, INC.
400 Commonwealth Dr., Warrendale, PA 15096
(412) 776-4841
J. Gilbert, Executive Vice President

SOCIETY OF PROFESSIONAL DRIVERS
P.O. Box 491, Paoli, PA 19301
(215) 647-0818
Bill Shore, Executive Director

THE ROAD INFORMATION PROGRAM, INC.
1200 18th Street, N.W., Suite 314, Washington, D.C. 20036
(202) 466-6706
Donald T. Knight, Executive Director

TIRE INDUSTRY COUNCIL
National Press Building, Suite 766, Washington, D.C. 20045
(202) 783-1022
Frank Holeman, Director

TRANSPORTATION RESEARCH BOARD
National Academy of Sciences, 2101 Constitution Avenue, N.W., Washington, DC 20006
(202) 334-1433
Thomas Dean, Director

TRUCK RENTING AND LEASING ASSOCIATION
1700 Pennsylvania Ave., N.W., Suite 1303,
Washington, DC 20006
(202) 347-2372
Beverly F. Walker, Executive Staff Director

WESTERN VEHICLE LEASING ASSOCIATION
3619 Motor Avenue, Suite 300, West Los Angeles, CA 90034
(213) 478-0215
Bruce Williams, President

EPA Gas Mileage Figures

(Continued from page 12)

MPG	Make	Transmission	CID	Cyl.
27	Mitsubishi Space*	A3	122	4
29	Olds Firenza Cruiser	M5	110	4
27	Olds Firenza Cruiser	A3	110	4
28	Olds Firenza Cruiser	M4	121	4
27	Olds Firenza Cruiser	M5	121	4
23	Olds Firenza Cruiser	A3	121	4
28	Plymouth Colt Vista	M5	122	4
28	Plymouth Colt Vista	M4x2	122	4
27	Plymouth Colt Vista	A3	122	4
29	Pontiac 2000 Sunbird	M5	110	4
27	Pontiac 2000 Sunbird	A3	110	4
28	Pontiac 2000 Sunbird	M4	121	4
29	Subaru Wagon	M5	109	4
26	Subaru Wagon	A3	109	4
29	Subaru Wagon	M5	109	4
26	Subaru Wagon	A3	109	4
22	Toyota Cressida Wagon	A4	168	6
34	Toyota Tercel Wagon	M5	89	4
32	Toyota Tercel Wagon	A3	89	4
31	Toyota Tercel Wgn 4WD	M5	89	4
42	Volks Quantum Wagon	D-M5	97	4
32	Volks Quantum Wagon	D-A3	97	4
20	Volks Quantum Wagon	A3	131	5

NOW YOU CAN RENT A CAR FROM US WHILE YOUR FLEET CAR IS BEING REPAIRED. ALL IN ONE STOP. $22 Low Flat Daily Rate. '83 Models. Primary Liability and Collision Insurance Included. Unlimited Mileage.

Major Mechanical Repair Program Covers:

Engine repair and replacement
Air Conditioning and Repair
Cooling System and Radiator
Drive Shaft and Rear Axle
Road Service and Towing

Computerized Maintenance Reports

OUR PAST INNOVATIONS ARE TODAY'S INDUSTRY STANDARDS

Consolidated Service Corporation

P.O. Box 4809, Chicago, Illinois 60680
(312) 640-2620